Introduction

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In the beginning the desert
was the ashes of a woman
inhabited by a storm.
Hidden secrets echoed,
and the silent poet
lay down on its grasses alone
or sat between its light
and shade, looking for something
that had disappeared
in its endless, rust-coloured mirrors.

At the beginning, the language of the desert
was grass blooming against the wall of wind,
tall palms swaying in the season of seeding
and cinders carried by air
to the blue welcome of warm sand.
She was our first fountain, our mother,
who held us, then gave us away
to the age of waiting cities.

The Desert
Poem by Al-Munsif al-Wahaybi
Translated by Salma Khadra Jayyusi and Naomi Shihab Nye

Desert environments have long captured the imagination of artists, authors and poets across the world. They are often depicted as barren, mysterious wastelands that are uninhabitable by humankind (Wild 1994). From famous adventure novels such as *Wind, Sand and Stars* (1948) by A. Saint-Exupery to science fiction books such *Dune* (1961) by F. Herber, deserts have been chosen to depict alien environments in which the harsh, wild landscape seems to extend over the horizon forever. Desert landscapes

have also played an important role in the foundation of religious myths and are viewed as places of important spirituality for many cultures to this day.

Despite the importance of deserts in many societies and although deserts cover almost twenty per cent of the world, few efforts have been made to conduct a cross-cultural analysis of how humans have adapted to these arid climes. Inspired by the seminal work, *Desert Peoples: Archaeological Perspectives* (Veth et al. 2005), our volume aims to broaden the case studies beyond the scope of hunter-gatherer societies and apply new theoretical perspectives in archaeological research. The goals of this volume are to address human adaptation to this extreme environment in a global perspective and address long-term social dynamics of a diverse range of communities in these areas. The research presented in this volume includes work from a variety of time periods in the deserts of Australia, Namibia, Qatar, Peru, and the arid Bolivian high plateau.

Although desert environments are generally viewed as barren expanses, many of the articles in the volume illustrate how societies have been able to not only survive but *thrive* in these environments. The unique challenges of living in a desert ecosystem display a variety of human ingenuity and adaptation. Archaeological evidence suggests that humans began to inhabit and successfully occupy the world deserts from the post-glacial era (Gamble 1993). There is evidence of human habitation in the Namib and Kalahari Deserts dating back 30,000 years (Robinson et al.1996) and people populated the arid highlands and dry-hot deserts of South America more than 12,000 years ago (Borrero 2005, Capriles et al. 2018, Marques et al. 2012). Since these arid landscapes are characterized by low biomass and a scarcity of critical resources, people of the past were confronted with a variety of challenges as they began to colonize desert environments.

Archaeological studies of deserts have traditionally focused on the relationship between different cultural developments and environmental conditions (Smith 2005, Veth et al. 2005). Scholarly interest has been devoted to pursuing investigations that reveal the economic strategies of hunter-gatherers in desert environments (Veth et al. 2005) and the development of farming societies in dry lands (Graeme and Gilberston

2000). While some researchers consider that the development of technological adaptation were critical to acclimatize to these environments (Bettinger et al. 2006, Binford 1980), others argue that both behavioural and social mechanisms were the most essential aspects to flourish in arid lands (Smith 2005).

Desert Technologies

Most technological advancement in desert climes centered around the procurement of one of the most limited resources in arid landscapes: water. Cultures across the world independently developed different types of technology for the management of water. These also included irrigation techniques and strategies to expand arable land. Archeological remains of irrigation techniques such as these have been found in Pre-Colombian Peru (see Bray 2013; Netherley 1984; Zimmerer 1995), Ancient Egypt (see Abdel-Dayem, Abdel-Gawad, Bazza 2007; Fahmy 2007 and Mays 2010;), Ancient Mesopotamia (Adams 1981; Tamburrino 2010; Wilkinson et al. 2015) and many other arid landscapes across the world. Archaeological examples of technology related to water management includes canals, dams, 'roman' wells, and siphons. Other more unique forms of water management include the hanging of delicate nets on poles in the deserts of Peru which gather moisture from the fog that periodically passes across the nets in the *lomas* (or fog oases) near the Peruvian coast (Beresford-Jones et al. 2015). More modern forms of desert technologies include desalinization technology that allow for the conversion of salt water to fresh water, particularly important in coastal desert environments.

Behavioural and Social Mechanisms in Deserts

Others argue that behaviours as social mechanisms were the most essential aspects to success in arid lands (Smith 2005). Social bonding and the social network of communities were both key elements to surviving and thriving in desert environments. This perspective has been used in the analysis of Australian desert population (Smith 2014) and in ritual practices of the people in the Kalahari Desert (Kinahan 2018).

The seasonal predictability of limited resources resulted in the importance of behavioural flexibility of mobile foragers in arid environments (Yellen 1977). This behavioural flexibility was key to the success of people who adapted to different desert environments such as in the Gobi Desert (Janz et al. 2017), Arctic tundra (Yellen 1977) and the African Kalahari Desert (Hitchcock and Ebert 1989). Likewise, human adaptation to the arid China and Tibetan Plateau during the transition from Late Pleistocene to Holocene (Madsen et al. 2007) was possible in part due to foraging strategies and behavioural flexibility.

Technological advancement as well as behavioural and social mechanisms clearly play a role in the active process of adapting to desert environments. These perspectives have both greatly contributed to the field of desert archaeology. Indeed, both processes are often inter-related whereby the development of new technologies relied on or resulted in the development of new social mechanisms within desert societies. Alternatively, existing or new behavioural and social mechanisms may have spurred the development of new technological adaptation. Both processes are key to understanding the cultural trajectories of desert societies.

Preservation

Notably, deserts also provide access to well-preserved archaeological records of perishable materials that are not often available in other archaeological contexts. This material record enriches our understanding of people living in these scenarios, while also allowing us to explore cross-culturally the lives of desert peoples. Perishable materials reveal unprecedented insights into people from the past (see Adovasio et al. 2014, Hardy 2008, Hurcombe 2007, 2008). Organic artefacts are well preserved in these arid zones since the lack of moisture and extreme temperatures are ideal conditions for preserving perishable technology such as textiles, wood, feather, and other types of organic remains. Examples of this astounding preservation includes the famous Chinchorro mummies of the Atacama Desert that are dated as far back as 5050 BC (Santoro et al. 2016; Marques et al. 2012).

Vince Lee (1988) describes the lack of preservation of Inca roof structures as the "lost half of Inca architecture". Indeed, the nature of archaeology and of organic preservation results in only a partial material record across the world. Yet, preservation that results from the arid nature of deserts can provide access to the "lost half" of the material record in archeological contexts globally. Information gleaned from desert climes can shed light on the way of life beyond the deserts. For example, the preservation of feathered tunics on the north and south coasts of Peru provide access into the thriving feather trade during the Wari and Inca Empires (Wilkinson 2018) and how feathered garments would have been worn as a symbol of high-status across different regions.

Major Themes

Although the articles in this volume are from different parts of the world, there are several themes that are shared across their projects and contexts. Some of the major themes include:

- How desert landscapes were marked in the past to stake claims to the terrain, often due to limited resources
- How cultural beliefs were mapped onto the desert landscape
- How people adapted to desert environments as well as how people shaped the desert environment

We see these as salient themes throughout the volume resulting in interesting cross-cultural parallels. In both of the articles from Bird et al. and Moulin, desert dwellers mapped sacred ideas onto the landscape that contributed not only to their movement and navigation through the environment but also to how they interacted and perceived the desert landscapes. In Moulin's contribution to this volume set in the Peruvian Andes, aspects of the landscape were *huacas*, or sacred spaces within the environment that were viewed to be alive. *Huacas* were (and still are) interwoven into an ideological network whereby Andean notions of reciprocity required ritual offerings to huacas in return for resources and general human prosperity. Similarly, the spiritual and the ecological

aspects of the environment are also inextricably entangled in the case-study from Western Australia in the paper by Bird and colleagues. The desert landscape is viewed as a living entity by the Aboriginal people of Western Australia and active engagement was required for survival.

The theme of technological and cultural adaptation to desert environments is also a topic that can be found in all of the articles within this volume. Alacia and Gonzalez La Rosa give an in-depth analysis of how the development and use of camelid domestication on the coasts of Pre-Colonial Peru helped to promote the expansion and flourishing of coastal societies. The management of limited resources, such as food and water, in later periods of the Peruvian past can be illustrated in the case-study regarding Republican ports of Peru in this volume by Boza Cuadros. The survival of these ports relied on new technologies, such as desalinization machines, as well as the dependency on local indigenous knowledge of the desert environment.

An additional parallel is the longevity of certain cultural practices and social mechanisms that have persisted through time, especially in relation to the marking of territories. The use of rock art, such as with the examples of Western Australia given in Bird et al.'s piece and Namibia presented by Breuing in this volume, have persisted for thousands of years. This may illustrate the success of these cultural adaptations to desert environments and the social behaviors that aided in their acclimatization. In the Andean region, ritual practices in relation to the sacred, and indeed animate landscape have continued to modern-day, as illustrated by the examples from the Bolivian highlands by Stone's article and the Pisco Valley of Peru in Moulin's piece.

Although desert environments result in similar conditions—one marked with low biomass, limited resources, and arid climes—people groups reacted and adapted very differently to these challenges. Volume 34.1 of the *ARC* does not aim to support claims of environmental determinism, although the environmental conditions of deserts certainly had an impact on people's way of life in the past. Although the characteristic attributes to desert climes impacted the cultural trajectory of many people groups, the people in turn also shaped the desert environment. Technologies

such as irrigation and social mechanisms like the periodic movement of mobile communities, as discussed by Roberts et al., impacted the desert landscape.

Articles of the Volume

Volume 34.1 of the Archaeological Review from Cambridge contains seven articles, each presenting specific case studies from different periods and geographic locations (fig.1.)

This volume features research from around the globe, including Bolivia, Peru, Qatar, Namibia, and Australia. These articles cover a vast time span, beginning with the Early Holocene and stretching to present indigenous communities.

Two articles in this volume, Bird et al. and Breunig, investigate rock art in desert environments. Breunig investigates hunter-gatherer societies in the Namib Desert by a systematic analysis of paintings and petroglyphs. He argues that the spatial differences in rock art style likely signifies differences in group identity. Deliberate efforts to destroy or interpretation of rock art as a manifestation of territorial concerns and boundaries, provides a new alternative to the well-known explanations for southern African rock art, which often involve shamanism and trance.

The article from Bird et al. illustrates the mythological narratives of indigenous communities in the Western Australian desert. The authors include other lines of evidence to further investigate the connection between people and 'Country'. Aboriginal people discuss Country as they would a person and the desert landscape is seen as a living entity with consciousness. It is believed that Ancestral Spirits progressed over the desert land and created life and important physical geographic formations and sites. Here, the desert is interwoven with the identity of indigenous communities. Marking the land though rock art allowed for Aboriginal people to interact with the landscape as well as to navigate the uncertainties of living in an arid environment.

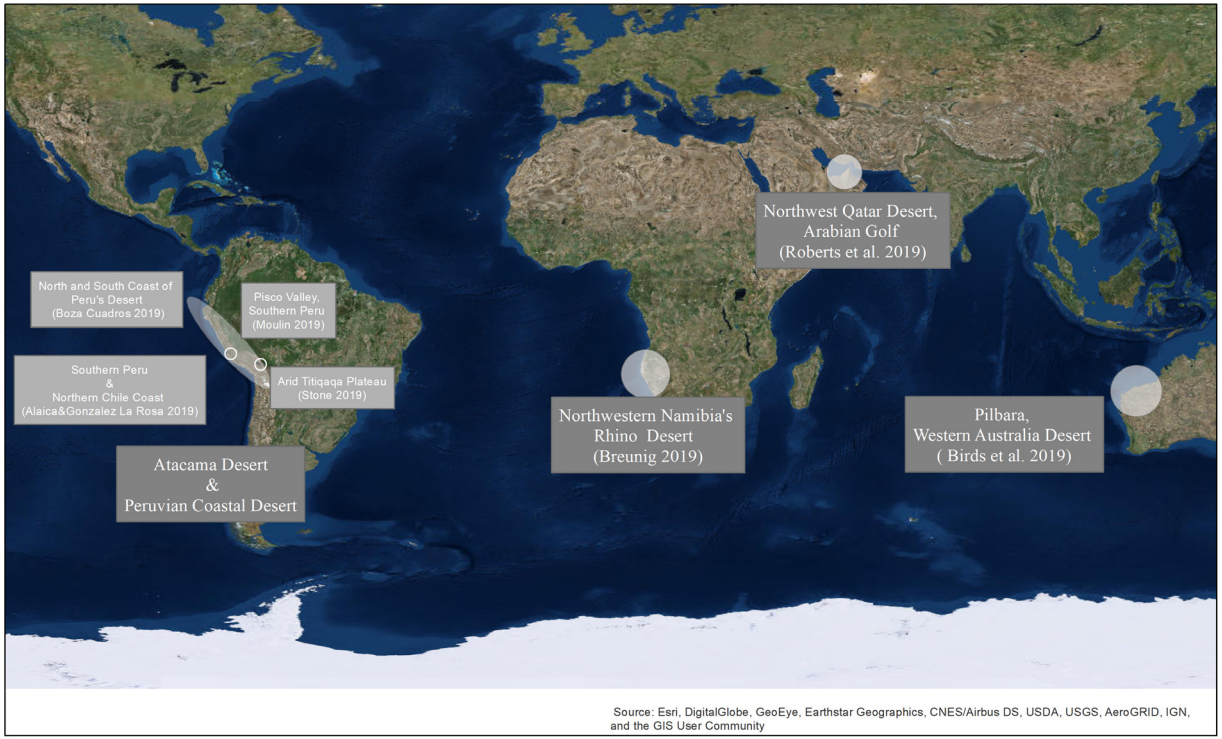

Fig 1. Map of the deserts in this Volume

Roberts et al. investigate nomadic societies in Qatar, Southern Arabia through geospatial methodologies. The authors seek to challenge deeply rooted theoretical prejudice regarding the archaeological accessibility of mobile desert societies. Their research illustrates that the remains of mobile desert communities are both archaeologically visible and accessible. They also propose the idea of the Qatar desert as home to both mobile and sedentary communities, whose subsistence was linked with maritime trade, pastoralism, and conflict. Evidence suggests that people who inhabited the Qatar desert actively participated within an extensive network of overland mobility and interaction.

Moulin's article discusses the path and caravan networks in the Atacama Desert in southern Peru. By investigating the location or these paths, the author seeks out the perspectives and perceptions of those who travelled along these routes in Pre-Colonial times. These roads became part of the landscape and facilitated the movement of people, ideas, and material culture during the Late Intermediate Period (1000AD–1430 AD). Moulin's work suggests that the location of these routes across the desert may have also been influenced by Andean animism whereby parts of the landscape were considered to be sacred.

Stone's contribution to the volume draws upon indigenous practices in relation to the importance of water in the dry highlands of the Bolivian Andes— a high altitude desert area. Based on ethnographic data, the author discusses Aymaran communities worship water not only as economic resource but a living component of their surroundings. Mother Lake, the life force in waters and lakes, is the recipient of ritual displays and offerings. Mother Lake, and thereby water itself, is discussed through a framework of Andean the reciprocity between people and nature. Performative rituals that include dance, music and costume serve as tribute to the importance of water in this desert environment. Stone argues that ethnographic work can be used to better understand ritual acts and performances that would have taken place within the various archeological remains of the Bolivian Andes.

Alaica and Gonzalez La Rosa investigate the role of camelids in the desert coast of Northern and Southern Peru in the Pre-Columbian past.

They argue that the local use of camelids on the coast allowed for the intensification of horizontal exchange systems across desert valleys in contrast to vertical exchange networks between the highlands and the coast. This horizontal mobility allowed for agriculturalist, fisherman, pastoralists, and other groups to strengthen their own social bonds. Alacia and Gonzalez La Rosa posit that the fortification of these social bonds contributed to the development of powerful coastal polities and spheres of ideological influence at different point in prehistory.

Boza Cuadros' article focuses on the trade and economic strategies throughout the desert ports of southern Peru in the Republican period (1821–1879 AD). The author highlights the importance of the exchange of crucial resources, such as food and water, at these desert ports. Utilising archaeological, cartographic and documentary data, Boza Cuadros contextualizes these ports within the emergence of the Republic of Peru. She illustrates how the survival and success of these ports relied on indigenous knowledge, regional governments as well as foreign capital.

Final Comments

The articles within Volume 34.1 *Desert Archaeology* of the Archaeological Review from Cambridge contribute different perspectives to the exploration of deserts not only archaeologically but also environmentally, culturally and spiritually. This volume explores the environmental characteristics of desert landscapes and how these arid climes often result in shared challenges to those that inhabit it, such as the lack of resources and harsh living conditions. However, this research illustrates how desert communities should not be seen as passive survivors of desert environments, but as active agents who thrived in their arid homelands.

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